We claim:

1. A rotor assembly for an electromechanical machine, comprising:

a rotor connectable to a shaft for rotational movement therewith, the rotor extending along an axis and having first and second circumferentially spaced lobes projecting radially therefrom;

first and second sets of laminated pole pieces, each set of pole pieces receivable on a corresponding lobe; and

a magnet disposed between the sets of poles pieces.

2. The rotor assembly of claim 1 further comprising a magnet retention ring for preventing radial movement of the magnet, the magnet retention ring having a radially outer edge and including:

a backing plate having first and second cutouts therein for receiving corresponding lobes therethrough; and

a magnet retention element projecting from a first side of the backing plate, and extending between the first and second sets of laminated pole pieces.

3. The rotor assembly of claim 1 wherein each lobe projecting from the rotor includes a neck terminating at an enlarged head

4. The rotor assembly of claim 3 wherein each of the laminated pole pieces is generally C-shaped and includes first and second ends separated by a predetermined distance for accommodating the neck of a corresponding lobe therebetween.

5. The rotor assembly of claim 2 wherein the magnet retention element includes a radially outer surface extending between the first and second sets of laminated pole pieces and an inner surface directed towards the magnet.

6. The rotor assembly of claim 5 further comprising a shim positioned between the inner surface of the magnet retention element and the magnet for preventing radial movement of the magnet during rotation of the rotor.

7. The rotor assembly of claim 1 wherein each set of laminated pole pieces includes a plurality of first pole pieces having a first radial thickness and a plurality of second pole pieces having a second radial thickness.

8. The rotor assembly of claim 7 wherein the plurality of first pole pieces of a corresponding set of laminated pole pieces are positioned adjacent each other to form a first stack and wherein the plurality of second pole pieces of the corresponding set of laminated pole pieces are positioned adjacent each other to form a second stack.

9. The rotor assembly of claim 7 wherein the first radial thickness is greater than the second radial thickness.

10. A rotor assembly for an electromechanical machine, comprising:

a rotor connectable to a shaft for rotational movement therewith, the rotor extending along an axis and having a plurality of circumferentially spaced lobes projecting radially therefrom;

a plurality of ring assemblies supported on the rotor, each ring assembly including a plurality of circumstantially spaced poles supported on corresponding lobes; and

a plurality of magnets circumferentially spaced about the rotor and extending through the ring assemblies, each magnet being generally parallel to the axis of the rotor and being disposed between corresponding pairs of poles of each ring assembly.

11. The rotor assembly of claim 10 wherein each ring assembly includes a magnet retention ring for preventing radial movement of the plurality of magnets, each magnet retention ring having a radially outer edge and including:

a backing plate having a plurality of cutouts therein for receiving corresponding lobes therethrough; and

a plurality of circumferentially spaced magnet retention elements projecting from a first side of the backing plate, each magnet retention element extending between corresponding pairs of poles.

12. The rotor assembly of claim 11 wherein each magnet retention element of each magnet retention ring has a retaining bar projecting from a corresponding terminal end thereof and wherein each backing plate includes a second side having plurality of circumferentially spaced retaining bar receipt cavities formed therein, each retaining bar receipt cavity adapted for receiving a corresponding retaining bar of an adjacent magnet retention ring in a mating relationship.

13. The rotor assembly of claim 10 wherein each of the poles of each ring assembly includes a plurality of laminated pole pieces.

14. The rotor assembly of claim 13 wherein the rotor includes first and second ends and wherein one of the plurality of ring assemblies is positioned adjacent the first end of the rotor.

15. The rotor assembly of claim 14 wherein the laminated pole pieces of each of the poles of the one of the plurality of ring assemblies positioned adjacent the first end of the rotor includes a plurality of first pole pieces having a first radial thickness and a plurality of second pole pieces having a second radial thickness.

16. The rotor assembly of claim 15 wherein the first radial thickness of the first poles pieces is greater than the second radial thickness of the second pole pieces.

17. The rotor assembly of claim 16 wherein the first poles pieces are positioned adjacent the first end of the rotor.

18. The rotor assembly of claim 13 wherein each of the laminated pole pieces includes a generally arcuate, radially outer edge.

19. The rotor assembly of claim 13 wherein each of the laminated pole pieces includes a leading edge and a trailing edge which are asymmetrical.

20. An electromagnetic machine, comprising:

a stator extending along a longitudinal axis and having an inner surface defining a rotor receipt cavity;

a rotor extending along and rotatable about the longitudinal axis, the rotor being positioned with the rotor receipt cavity;

a plurality of ring assemblies supported on the rotor, and

a plurality of magnets circumferentially spaced about the rotor and extending through the ring assemblies, each magnet being generally parallel to the axis of the rotor.

21. The electromagnetic machine of claim 20 wherein rotor includes a plurality of circumferentially spaced lobes projecting radially therefrom and wherein each ring assembly includes a plurality of circumferentially spaced poles supported on corresponding lobes.

22. The electromagnetic machine of claim 21 wherein each of the poles of each ring assembly includes a plurality of laminated pole pieces.

23. The electromagnetic machine of claim 22 wherein the rotor includes first and second ends and wherein one of the plurality of ring assemblies is positioned adjacent the first end of the rotor.

24. The electromagnetic machine of claim 23 wherein the laminated pole pieces of each of the poles of the one of the plurality of ring assemblies positioned adjacent the first end of the rotor includes a plurality of first pole pieces having a first radial thickness and a plurality of second pole pieces having a second radial thickness.

25. The electromagnetic machine of claim 24 wherein the first radial thickness of the first poles pieces is greater than the second radial thickness of the second pole pieces.

26. The electromagnetic machine of claim 25 wherein the first poles pieces are positioned adjacent the first end of the rotor.

27. The electromagnetic machine of claim 22 wherein each of the laminated pole pieces includes a leading edge and a trailing edge which are asymmetrical.

28. The electromagnetic machine of claim 20 wherein the stator includes a plurality of laminated stator pieces laminated along an axis generally parallel to the longitudinal axis, the laminated stator pieces being radially spaced from the poles of the rotor assemblies.

29. The electromagnetic machine of claim 20 wherein the stator includes a plurality of radially extending cooling channels extending therethrough, wherein the cooling channels communicate with the rotor receipt cavity.